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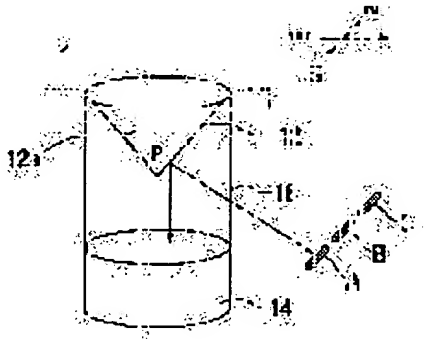
(54) DISPLAY SYSTEM AND IMAGE PICKUP DEVICE

(57)Abstract:

PURPOSE: To obtain an image pickup device capable of photographing neighboring scenes in all directions at low cost with high reliability and superior durability.

CONSTITUTION: The scenes in all directions on the lower side of the image pickup device 2 are reflected on a conical mirror 12 on the side surface of which a mirror surface is formed, and are image-picked up by a CCD camera 14. An image pickup result is image-converted by a converter, and a converted image is converted by a TV, etc. The image pickup result of the CCD camera 14 shows that an image reflected at a position nearer to the apex of the side surface 12a of the conical mirror 12 can be more compressed. Therefore, the converter converts the image pickup result of the CCD camera 14 to the image with uniform compressibility as a whole setting the image reflected on the prescribed position of the side surface 12a as reference based on the shape of the conical mirror 12.



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* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] this invention relates to the image pck-up equipment used for the display system which picturizes and displays the scenery of the circumference etc., and it.
[0002]
[Description of the Prior Art] When the body which consists in the omnidirection of the circumference was picturized, it has arranged so that a direction which is different in two or more image pck-up equipments, respectively may be picturized, and the scenery of the surrounding methods of four was picturized, or conventional image pck-up equipment fixed image pck-up equipment on the body of revolution which rotates by driving by the motor etc., and was picturizing the scenery of a circumference omnidirection by rotating this body of revolution.
[0003]
[Problem(s) to be Solved by the Invention] However, it becomes a system expensive as a whole to use two or more image pck-up meanses as mentioned above. Moreover, by rotation, rotating the body of revolution by which image pck-up equipment was placed on it, and picturizing can twist the cable of image pck-up equipment etc., and it causes failure.
[0004] this invention can solve the problem mentioned above, the scenery of the circumference omnidirection can be picturized, and it is in offering the display system reliability moreover excelled [display system] in endurance highly by the low cost, and image pck-up equipment.
[0005]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, the display system of this invention has an image pck-up means, the reflective means to which are arranged near this image pck-up means, make reflect the image of the body of the omnidirection of the lower part of an image pck-up means, and an image pck-up means is made to point, and the display means on which the picture picturized with the aforementioned image pck-up means is displayed.
[0006] Moreover, the display system of this invention has an image pck-up means, the reflective means to which are arranged near this image pck-up means, make reflect the image of the body of the omnidirection of the lower part of an image pck-up means, and an image pck-up means is made to point, the display means on which the picture picturized with the aforementioned image pck-up means is displayed, and a conversion means change into the image data of a two-dimensional plane the image data according to the picture picturized with the aforementioned image pck-up means.
[0007] The aforementioned reflective means is the cone by which the reflective member was formed in the outside side preferably, and the aforementioned conversion means changes into the image data of a two-dimensional plane the image data according to the picture picturized with the aforementioned image pck-up means based on the configuration of the outside side of the aforementioned reflective means.
[0008] Furthermore, a reflective cone-like means by which the reflective member was formed in the outside to which the display system of this invention is arranged near an image pck-up means and this image pck-up means, make reflect the image of the body of the omnidirection of the lower part of an

image pck-up means, and an image pck-up means is made to point, It has the display means on which the picture which picturized optically uniformly the image of the body of the omnidirection of the lower part of the image pck-up means to which it was arranged between the aforementioned reflective means and the aforementioned image pck-up means, and the aforementioned reflective means pointed with the amendment correcting-lens means and the aforementioned image pck-up means is displayed.
[0009]
[Function] In the display system of this invention, a reflective cone-like means by which the reflective member was formed in the outside side points to the image of the body which consists in the omnidirection of the lower part of an image pck-up means, and it is picturized by the image pck-up means. And the picture picturized with the image pck-up means is displayed by the display means.
[0010] Moreover, in the display system of this invention, a reflective cone-like means by which the reflective member was used for the outside side points to the image of the body which consists in the omnidirection of the lower part of an image pck-up means, and it is picturized with an image pck-up means through a correcting-lens means. And the picture picturized with the image pck-up means is displayed by the display means.
[0011] At this time, the image reflected in the position with the image of the body reflected on the outside side of a reflective means near the vertex of a reflective cone-like means was compressed, and the compressed image was being extended in the direction of a curved surface of the outside side. A correcting-lens means makes an image pck-up means picturize the uniform image transformed inversely by performing reverse conversion optically with this conversion to the image by which compression extension conversion was carried out according to the configuration of the outside side of this reflective means. Therefore, an image pck-up means can picturize the image of the body which was changed with the reflective means and restored after that.
[0012] Furthermore, in the display system of this invention, a reflective cone-like means by which the reflective member was used for the outside side points to the image of the body which consists in the omnidirection of the lower part of an image pck-up means, and it is picturized with an image pck-up means. And the picture picturized with the image pck-up means is changed into the image data of a two-dimensional plane with a conversion means, and the picture according to this changed image data is displayed by the display means.
[0013]
[Example] The 1st example of the display system of this invention is explained. The display system of this example is a display system which picturizes the scenery around a building and displays the scenery on the display of TV. The system configuration view of the display system of this example is shown in drawing 1 . The plot plan of each component of this example is shown in drawing 2 . As shown in drawing 1 and drawing 2 , the display system of this example consists of an inverter 4 as image pck-up equipment 2, an antenna 6, a mixer 8, and a conversion means, and TV10 as a display means.
[0014] An antenna 6 is explained. As shown in drawing 2 , an antenna 6 is attached in the antenna pillar 16 installed in the roof of a building etc., receives TV signal, and outputs this to a mixer 8.
[0015] Image pck-up equipment 2 is explained. The outline perspective diagram of image pck-up equipment 2 is shown in drawing 3 . The outline cross section of image pck-up equipment 2 is shown in drawing 4 . Image pck-up equipment 2 consists of CCD cameras 14 as the cone mirror 12 and image pck-up means as a reflective means, as shown in drawing 1 , and the portion to which CCD camera 14 is located at the nose of cam of the antenna pillar 16 as shown in drawing 2 and drawing 4 is turned at the nose of cam of the antenna pillar 16, and it is fixed and installed.
[0016] The cone mirror 12 is carrying out the shape of a cone, as shown in drawing 3 , and side 12a is formed by the mirror plane. the central angle of the cone mirror 12 -- theta is theta>=90 degrees, as shown in drawing 4 , reflects the image of the body (scenery) which consists under the image pck-up equipment 2, and points to it in CCD camera 14 It is reflected in side 12a of the cone mirror 12, and CCD camera 14 points to the image of the body which consists in the range surrounded by the dotted line 13 shown in drawing 4 .
[0017] CCD camera 14 is explained. CCD camera 14 picturizes the body which consists under the

image pck-up equipment 2 reflected in side 12a of the cone mirror 12, changes this image pck-up result into the electric picture signal according to the scan, and outputs this to a mixer 8. At this time, the cone mirror 12 points to the scenery of the omnidirection (360 degrees) of the lower part of image pck-up equipment 2, and CCD camera 14 picturizes the scenery of the lower part omnidirection (360 degrees) of image pck-up equipment 2, as shown in drawing 5 (B). At this time, as shown in drawing 3 , the bodies A, B, and C of the square pole which consists in an equidistant position from side 12a between the south (S) and easts (E) of the lower part of image pck-up equipment 2 If it sees with the naked eye from the position of side 12a of the cone mirror 12, although it is visible as images A1, B1, and C1 of a rectangle as shown in drawing 5 (A), if it picturizes by CCD camera 14 through the cone mirror 12, it will be picturized as the image A2 as shown in drawing 5 (B), B-2, and C2.

[0018] That the images A1, B1, and C1 seen with the naked eye are picturized in an image A2, B-2, and a configuration like C2 by CCD camera 14 For example, as shown in the cross section 5 of P points of the cone mirror 12 in drawing 3 and drawing 3 (C), in case the image of Body A is reflected in P points of side 12a of the cone mirror 12 It is because it is reflected in CCD camera 14 as image A' twisted by the curved-surface configuration of side 12a which reflects Body A in the direction of a curved surface. Torsion by this direction of a curved surface increases in inverse proportion to the radius r of side 12a in which Bodies A, B, and C are reflected, and becomes so large (that it is reflected in the position near the stop O of the cone mirror 12) so that the radius of side 12a reflected is small. Moreover, the length of the image A2 shown in drawing 5 (B), B-2, and the direction of an arc of C2 is proportional to the radius r of side 12a in which Bodies A, B, and C are reflected as shown in drawing 5 (C). Since Body A was reflected from Body B in the position (small position of r) near the center of the cone mirror 12, when based on image B-2, to be shown in drawing 5 (B), from image B-2, the image A1 in CCD camera 14 of Body A was twisted by the direction of a curved surface, and was compressed in the direction of an arc. Moreover, since Body C was reflected in a position (big position of r) distant from the center of the cone mirror 12, when based on image B-2, as shown in drawing 5 (B), from B-2, the image C1 in CCD camera 14 of Body C is not twisted in the direction of a curved surface, and was extended in the direction of an arc. And the two-dimensional image pck-up result of 14 of a CCD camera as shown in drawing 5 (B) is changed into the-like 1-dimensional picture signal according to the scan, and is outputted to a mixer 8.

[0019] The formation of small lightweight and reduction-izing of power consumption are possible for this CCD camera 14, and as shown in drawing 2 , it can install image pck-up equipment 2 at the nose of cam of the antenna pillar 16. Moreover, as shown in drawing 3 and drawing 4 , transparent glass 18 is formed in the side of image pck-up equipment 2 so that the cone mirror 12 and CCD camera 14 may be covered inside.

[0020] A mixer 8 is explained. A mixer 8 inputs the picture signal according to the image pck-up, and TV signal which the antenna 6 received from CCD camera 14 of image pck-up equipment 2, and outputs these to an inverter 4 alternatively. The selection change of the output signal of a mixer 8 is performed by preparing a circuit changing switch in TV10, and a user operating this circuit changing switch.

[0021] An inverter 4 is explained. An inverter 4 outputs this TV input signal to TV10 as it is, when the mixer 8 has inputted TV input signal from an antenna 6. Moreover, when the mixer 8 has inputted the picture signal from CCD camera 14, an inverter 4 is read according to the scanning position of the restoration picture which inputs the picture signal according to the scenery (body) of the lower part omnidirection of image pck-up equipment 2 from CCD camera 14, memorizes this picture signal, and projects this memorized picture signal on TV10, and is outputted to TV10.

[0022] that is, it is compressed as it will go to Center O from radius r0 position, if the image pck-up result of CCD camera 14 it is indicated to drawing 5 (B) that mentioned above is based on the image in the position of a radius r0, it is extended as it goes to a periphery from the position of a radius r0, and it has become **'s Therefore, an inverter 4 outputs the picture signal which performed reverse compression extension conversion of the compression extension conversion by the cone mirror 12 to the picture signal according to the image pck-up result of CCD camera 14, and performed this reverse compression extension conversion to TV10, in order to restore on the basis of the image of the position

of r0 from the center O shown in drawing 5 (B) and to project the image pck-up result of CCD camera 14 on TV10. For example, as coordinate transformation is carried out with the coordinate transformation function f (x y) by the cone mirror 12 and it is shown in drawing 5 (B), when the scenery shown in drawing 5 (A) is picturized by CCD camera 14 An inverter 4 inputs the picture signal according to the image pck-up result of CCD camera 14 of drawing 5 (B), as shown in drawing 6 . A picture signal is restored by performing inverse transformation f-1 (x y) of the coordinate transformation function f of the cone mirror 12 (x y) to this picture signal, and this restored picture signal is outputted to TV10. That is, extension and an image C2 are compressed, the image A2 of drawing 5 (B) is changed into images A3 and C3, respectively, and the picture signal according to this conversion is outputted to TV10.

[0023] The block diagram of an inverter 4 is shown in drawing 7 . As shown in drawing 7 , an inverter 4 consists of memory 30, the RGB conversion circuit 32, the R record circuit 34, the G record circuit 36, a B record circuit 38, an output synchronizing signal generating circuit 42, and an input circuit 68.

[0024] Memory 30 memorizes the picture signal S8 inputted from CCD camera 14 through the mixer 8. At this time, a picture signal S8 is a composite signal by which the luminance signal, the chrominance signal, and the synchronizing signal were compounded.

[0025] The RGB conversion circuit 32 reads the picture signal S30 memorized by memory 30. Based on the chrominance signal contained in a picture signal S30, RGB decomposition of the picture signal S30 is carried out. R (red) signal S32r, Three color-difference signals of G (green) signal S32g and B (blue) signal S32b are taken out, S32g is outputted to the G record circuit 36, and S32b is outputted for S32r to the B record circuit 38 at the R record circuit 34, respectively. Moreover, the RGB conversion circuit 32 outputs synchronizing signal S32s for these taking the timing at the time of R signal S32r, G signal S32g, and B signal S32b inputting, respectively to the R record circuit 34, the G record circuit 36, and the B record circuit 38.

[0026] the picture which outputs the output synchronizing signal S42 which shows the timing which outputs R signal, G signal, and B signal with which each recorded the output synchronizing signal generating circuit 42 to the R record circuit 34, the G record circuit 36, and the B record circuit 38 to TV10 to TV10 -- outputting .

[0027] A user operates the key prepared in the input circuit 68, and an input circuit 68 specifies the field which it transforms using an inverter 4 among the pictures which CCD camera 14 picturized, and is displayed on TV10 by the polar coordinate. For example, a user inputs theta1, theta2, r1, and r2 into an input circuit 68 to transform the field 80 shown in drawing 10 by the inverter 4, and project on TV10.

[0028] The theta counter 64 and the y decoder 62 output theta1 and theta2 which were inputted from the input circuit 68, and r1 and r2 to x decoders 60 and the y decoder 62, respectively.

x decoders 60 output the signal S60 which shows the x-coordinate of the pixel of CCD camera 14 to which an x-coordinate consists in the field between costheta1-costheta2 to a readout circuitry 58 among the image pck-up results of CCD camera 14 based on following formula x=costheta.

The y decoder 62 outputs the signal S62 which shows the y-coordinate of the pixel of CCD camera 14 to which a y-coordinate consists in the field between sintheta1-sintheta2 to a readout circuitry 58 among the image pck-up results of CCD camera 14 based on following formula x=sintheta.

[0029] The R record circuit 34 inputs R signal S32r from the RGB conversion circuit 32, and the synchronizing signal S42 from the output synchronizing signal generating circuit 42, records R signal S32r, and outputs the resolution picture signal S34 according to the scan of the picture of TV10 to TV10 based on a synchronizing signal S42. The G record circuit 36 and the B record circuit 38 input G signal S32g and B signal S32b instead of R signal S32r, and are the same as that of the fundamental composition R record circuit 34.

[0030] The block diagram of the R record circuit 34 is shown in drawing 8 . As shown in drawing 8 , the R record circuit 34 consists of x decoders 50, the y decoder 52, the write-in circuit 54, memory 56, a readout circuitry 58, x decoders 60, a y decoder 62, a theta counter 64, and an r counter 66.

[0031] x decoders 50 and the y decoder 52 compute the x-coordinate and y-coordinate of a pixel of CCD camera 14 which outputted R signal which inputted the signal for synchronizing signal S32s from the RGB conversion circuit 32, and wrote in based on this synchronizing signal S32s, and the circuit 54

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inputted from the RGB conversion circuit 32, respectively, and output these to the write-in circuit 54, respectively.
[0032] The write-in circuit 54 inputs R signal S32r from the RGB conversion circuit 32, the signal S50 which shows the x-coordinate of the pixel from x decoders 50, and the signal S52 which shows the y-coordinate of the pixel from the y decoder 52, and makes the address computed from the signal S50 and signal S52 of memory 56 memorize the information on R signal.
[0033] Memory 56 memorizes R signal which wrote in according to the signal from the write-in circuit 54, and the circuit 54 inputted from the RGB conversion circuit 32 to the predetermined address. This memory 56 has the capacity which can memorize the one-frame picture of CCD camera 14 of R signal outputted to the R record circuit 34 from the RGB conversion circuit 32.
[0034] A readout circuitry 58 inputs the output synchronizing signal S42 from the output synchronizing signal generating circuit 42, the signal S60 from x decoders 60, and the signal S62 from the y decoder 62, reads R signal S32s according to the scan of the picture projected on TV10 based on the output synchronizing signal S42 from memory 56, and outputs it to TV10. In reading R signal S32s of the pixel located in the coordinate (X, Y) of the picture of TV10 at this time, R signal S32s of this pixel is equivalent to R signal S32s of the pixel located in the coordinate (x y) of CCD camera 14 which performed coordinate transformation f-1 to the coordinate (X, Y). Therefore, if R signal S32s is read from the address on which R signal S32s of the pixel located in the coordinate (x y) of CCD camera 14 of memory 56 was recorded, R signal S32s of the pixel located in the coordinate (X, Y) of the output picture of TV10 can be read. The coordinate (X, Y) of an output picture is inputted, and coordinate transformation f-1 prepares beforehand the translation table which outputs the address of the memory 56 corresponding to this coordinate, reads it by using this translation table, and acquires the address. Moreover, a readout circuitry 58 specifies the range of the picture outputted to TV10 based on the signal S60 and signal S62 which were inputted from x decoders 60 and the y decoder 62, reads R signal S32s corresponding to this range picture from memory 56 according to a scan, and outputs it to TV10.
[0035] TV10 inputs the picture signal from an inverter 4, and projects the picture according to this picture signal on a display. Although TV10 inputs the output picture signal according to the scenery of the omnidirection (360 degrees) of the lower part of the image pck-up equipment 2 which image pck-up equipment 2 picturized from the inverter 4 at this time, this output picture signal is divided into the picture signal corresponding to 90-degree scenery, respectively, for example, and the picture according to the divided picture signal is displayed on a display, respectively. You may take the method of displaying the scenery of the omnidirection (360 degrees) of the lower part of the image pck-up equipment 2 which image pck-up equipment 2 picturized by the picture of one sheet as the method of presentation of a display. According to the display system of this example, the scenery of the lower part omnidirection of image pck-up equipment 2 can be picturized, without rotating image pck-up equipment.
[0036] Although it outputted to TV10 in the above-mentioned example after changing the image pck-up result of CCD camera 14 by the inverter 4, you may output the image pck-up result of CCD camera 14 to TV10 as it is. In this case, the picture shown in TV10 at drawing 5 (B) projects as it is. Moreover, when [this] the main angle theta shown in drawing 4 of the cone mirror 12 may be theta< 90 degrees, the cone mirror 12 points to the scenery of the upper part omnidirection of image pck-up equipment 2 in CCD camera 14, and this scenery image is expressed as TV10.
[0037] Next, the 2nd example of the display system of this invention is explained. The composition perspective diagram of the display system of this example is shown in drawing 10 . The outline cross section of the display system of this example is shown in drawing 11 (A). As shown in drawing 10 , the display system of this example consists of the cone mirror 12, a correcting lens 19, CCD camera 14, and TV10.
[0038] A correcting lens 19 is formed between the cone mirror 12 and CCD camera 14, performs reverse compression extension conversion f-1 optically to the scenery image of the omnidirection of the lower part of the image pck-up equipment 2 reflected by the compression extension conversion f in side 12a of the cone mirror 12, and makes CCD camera 14 picturize this scenery image carried out reverse

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compression extension conversion f-1. As shown in drawing 11 (B), a correcting lens 19 is a lens with which from center O' to the criteria radius r0 was formed in the configuration of a concave lens, and from the criteria radius r0 to the radius r1 was formed in the configuration of a convex lens. Compression conversion is carried out with the convex lens of the criteria radius r0 to the radius r1 of a correcting lens 19, and the scenery image with which extended conversion was carried out in concave NZU of the criteria radius r0 from center O' of a correcting lens 19, and extended conversion of the scenery image by which compression conversion was carried out in side 12a of the cone mirror 12 was carried out in side 12a is picturized by CCD camera 14. Compression extension of the image reflected in the position of the criteria radius r0 of a correcting lens 19 is not carried out. This criteria radius r0 is determined according to the image pck-up area of the radius of CCD camera 14.

[0039] Drawing of the compression conversion by the concave lens of a correcting lens 19 is shown in drawing 12 (A). To be shown in drawing 12 (A), coordinate transformation of the image in Distance r (r>=r0) is carried out by the concave lens of a correcting lens 19 from the center O of CCD camera 14, and it is compressed into the image on Segment PQ. At this time, the distance of Segment PQ is pi-r 0/2. Drawing of the extended conversion by the convex lens of a correcting lens 19 is shown in drawing 12 (B). as shown in drawing 12 (B), coordinate transformation of the image in Distance r (r<r0) is carried out with the concave lens of a correcting lens 19 from the center O of CCD camera 14 -- having -- a segment -- it is extended to the image on P'Q' this time -- a segment -- the distance of P'Q' is pi-r 0/2

[0040] If the scenery reflected in side 12a of the cone mirror 12 shown in drawing 5 (B) is picturized by CCD camera 14 through a correcting lens 19, the images A4, B4, and C4 as shown in drawing 13 will be picturized. If compression extension of this image is not carried out on the basis of the image B4 and the image pck-up result of CCD camera 14 is outputted to TV10, the image projected on TV10 will become uniform over the whole picture. That is, the picture by which compression extension was carried out uniformly on the whole can be displayed on TV10 by making still more nearly optical the image compression extension conversion f Made optical at side 12a of the cone mirror 12 reverse compression extension conversion f-1 using a correcting lens 19, and picturizing by CCD camera 14. Since reverse compression extension conversion f-1 is optically performed before picturizing by CCD camera 14, generating with error can be suppressed only for the error by CCD camera 14.

[0041] Next, the 3rd example of the display system of this invention is explained. The block diagram of the display system of this example is shown in drawing 14 . As shown in drawing 14 , only the 1st display system, reflective means, and conversion means of an example which the display system of this example mentioned above differ from each other. The right square drill mirror 112 as a multiple cone of image pck-up equipment 102 is used for the display system of this example as a reflective means. Moreover, an inverter 104 processes the picture signal from CCD camera 14 according to the configuration of the right square drill mirror 112.

[0042] The right square drill mirror 112 is explained. The right square drill mirror 112 is carrying out the right square drill configuration, as shown in drawing 15 , and the four side 112a is formed by the mirror plane. Moreover, like the 1st example, the portion to which CCD camera 14 is located at the nose of cam of the antenna pillar 16 is turned at the nose of cam of the antenna pillar 16, and is fixed and installed in it. The outline cross section of the image pck-up equipment 102 in the profile line 111 of drawing 15 is shown in drawing 16 . As shown in drawing 16 , the right square drill mirror 112 is theta2 >=90 degree, and the degree theta 2 of angle of reflection reflects the image of the body which consists in the direction of each side 112a of the lower part of image pck-up equipment 102, and points to it in CCD camera 14.

[0043] At this time, the picture which CCD camera 14 picturizes is a picture as shown in drawing 17 , and as shown in drawing 15 , when x, y, and a z-coordinate are defined, the image pck-up field in x and the y-coordinate to which it points in marginal 112b of side 112a and which are picturized by CCD camera 14 is the field 111 shown in drawing 18 . Since this image pck-up field 111 changes with the angle of reflection theta 2 of the cone mirror 12, and the distance of CCD camera 14 and the right square drill mirror 112, diameters of CCD camera 14, etc., it determines these values by the field used as the candidate for an image pck-up. As shown in drawing 15 , when distance from marginal 112b is set to L,

the relation between M**1/L in the scenery M reflected in side 112c located in Distance L from marginal 112a, i.e., the image pck-up distance in drawing 18 , is. That is, the image pck-up range of CCD camera 14 is decreasing as it approaches the zero O of drawing 17 and drawing 18 .

[0044] An inverter 104 is explained. The block diagram of an inverter 104 is shown in drawing 19 . An inverter 104 consists of memory 130, a write-in circuit 154, memory 156, and a readout circuitry 158, as shown in drawing 19 .

[0045] Memory 130 inputs the picture signal S108 according to the scan of the image pck-up picture of CCD camera 14 to CCD camera 14 through a mixer 108 like the memory 30 mentioned above.

[0046] The write-in circuit 154 memorizes a picture signal S130 to the predetermined address of the memory 156 write in, input the picture signal S130 from memory 130 like a circuit 54, and corresponding to x of the image pck-up picture of CCD camera 14, and the y-coordinate mentioned above. Memory 156 is the same as memory 56.

[0047] In order to project separately on TV10 the picture corresponding to four each of side 112a of the right square drill mirror 112 for the image pck-up result of CCD camera 14 shown in drawing 17 as four frames, respectively, a readout circuitry 158 reads the image information about one side 112a of the positive square drill mirror 112 according to a scanning position among the picture signals memorized by memory 156, and outputs it to TV10. At this time, as shown in drawing 20 , the picture 159 of the scenery of the direction of north (N) and west (W) projects on the display of TV10. In order to project scenery on all sides, the readout circuitry 158 mentioned above is processed 4 times, and each picture signal is outputted and displayed on TV10.

[0048] Although the image pck-up result of CCD camera 14 was changed by the inverter 104 and outputted to TV10 in this example, since compression extension is not carried out, the scenery image reflected by the right square drill mirror 112 may output and display the image pck-up result of CCD camera 14 on TV10 as it is. Moreover, you may use right 8 pyramid MIRA or other multiple drill mirrors instead of the right square drill mirror 112. Moreover, when [this] the central angle theta 2 shown in drawing 16 of the right square drill mirror 112 may be theta2<90 degree, the right square drill mirror 112 points to the scenery of the upper part omnidirection of image pck-up equipment 102 in CCD camera 14 like the 1st example mentioned above.

[0049] The 4th example of this invention is explained. The block diagram of the display system of this example is shown in drawing 21 . As shown in drawing 21 , only the 1st which the display system of this example mentioned above, and 3rd display systems, reflective meanses, and conversion meanses of an example differ from each other. The rotation mirror 212 as a reflecting plate of image pck-up equipment 202 is used for the display system of this example as a reflective means. Moreover, an inverter 204 inputs the picture signal from CCD camera 14 according to rotation of the rotation mirror 212, performs predetermined processing, and outputs this processed picture signal to TV10.

[0050] The rotation mirror 212 is explained. The rotation mirror 212 is carrying out the configuration of a tabular, as shown in drawing 22 , and the field which faces CCD camera 14 is formed by the mirror plane. This rotation mirror 212 is connected through the motor 214 and the axis of rotation 213 which were attached in the front face of image pck-up equipment 202 by fixing, the axis of rotation 213 drives by the motor 214, and rotates, and it is interlocked with this axis of rotation 213, and is rotated with a predetermined rotational speed. The angle theta 3 which the rotation mirror 212 and the axis of rotation 213 make is theta3 <=90 degree, reflects the image of the body which consists under the rotation mirror 212, and points to it in CCD camera 14. At this time, the picture which CCD camera 14 picturizes is a picture as shown in drawing 23 , and the image 201 of the scenery of the lower part of the rotation mirror 212 projects it.

[0051] An inverter 204 is explained. The block diagram of an inverter 204 is shown in drawing 24 . As shown in drawing 24 , an inverter 204 consists of memory 230, a picture image formation circuit 254, and memory 256. Memory 230 inputs the picture signal S108 according to the scan of the image pck-up picture of CCD camera 14 to CCD camera 14 with a predetermined period through a mixer 8 like the memory 130 mentioned above. For example, since the scenery of an omnidirection (360 degrees) can be picturized if rotation is performed 360 degrees / 45 degree= 8 times per 45 degrees when the rotation

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mirror 212 can picturize the 45-degree scenery of the lower part at the time of a rotation halt, if the rotation mirror 212 sets to T time taken to rotate one time, the input period of memory 230 will be made into T/8. That is, if the rotation mirror 212 rotates one time, the picture signal according to eight pictures which CCD camera 14 picturized will be memorized by memory 230.

[0052] the picture signal of the landscape image with which eight picture signals which memory 230 memorized were read, combining these came out, and the lower part omnidirection (360 degrees) of image pck-up equipment 202 continued when the rotation mirror 212 rotated the picture image formation circuit 254 one time -- creation **** And this picture signal is outputted to memory 256. Memory 256 outputs the picture signal inputted from the picture image formation circuit 254 to TV10, and the picture according to this picture signal is expressed as TV10. According to the display system of this example, since only the rotation mirror 212 is rotated, the cable of image pck-up equipment etc. is twisted by rotation, and can prevent **.

[0053] this example may output and express the signal according to the picture which CCD camera 14 picturized to TV10 as real time, without using the picture image formation circuit 254. Moreover, like the 1st and 3rd examples mentioned above, **** of the central angle theta 3 shown in drawing 22 of the rotation mirror 212 is also good at theta3<90 degree, and the rotation mirror 212 points to the scenery of the upper part omnidirection of image pck-up equipment 202 in CCD camera 14 in this case.

[0054]

[Effect of the Invention] As explained above, according to the display system and image pck-up equipment of this invention, the scenery (body) of the lower part of an image pck-up means or an upper omnidirection can be picturized. Moreover, it becomes unnecessary to use two or more image pck-up equipments, and reduction of cost can be aimed at. Furthermore, since it is fixed, the image pck-up means excels [reliability] in endurance highly.

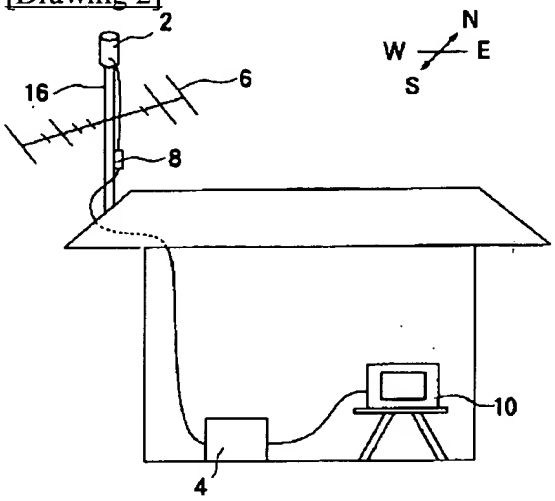
[Translation done.]

* NOTICES *

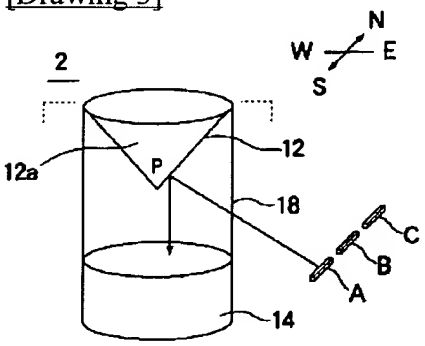
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

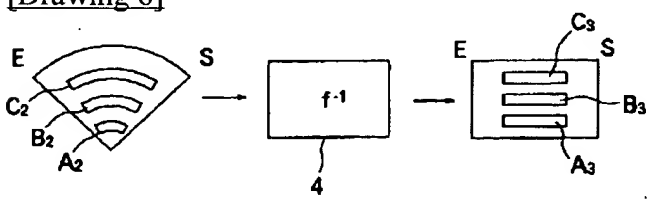
[Drawing 2]



[Drawing 3]

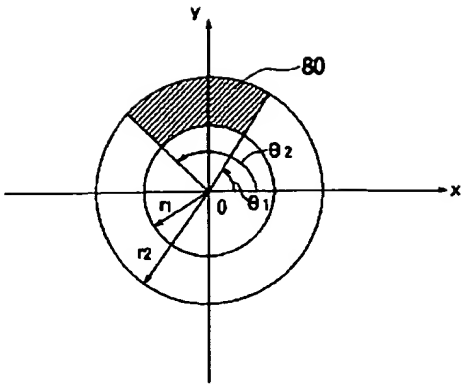


[Drawing 6]

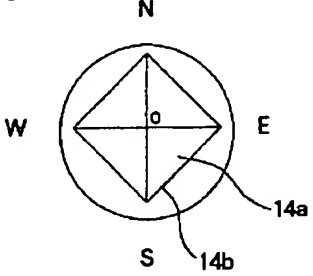


[Drawing 9]

h g cg b eb cg e e



[Drawing 17]



[Drawing 1]

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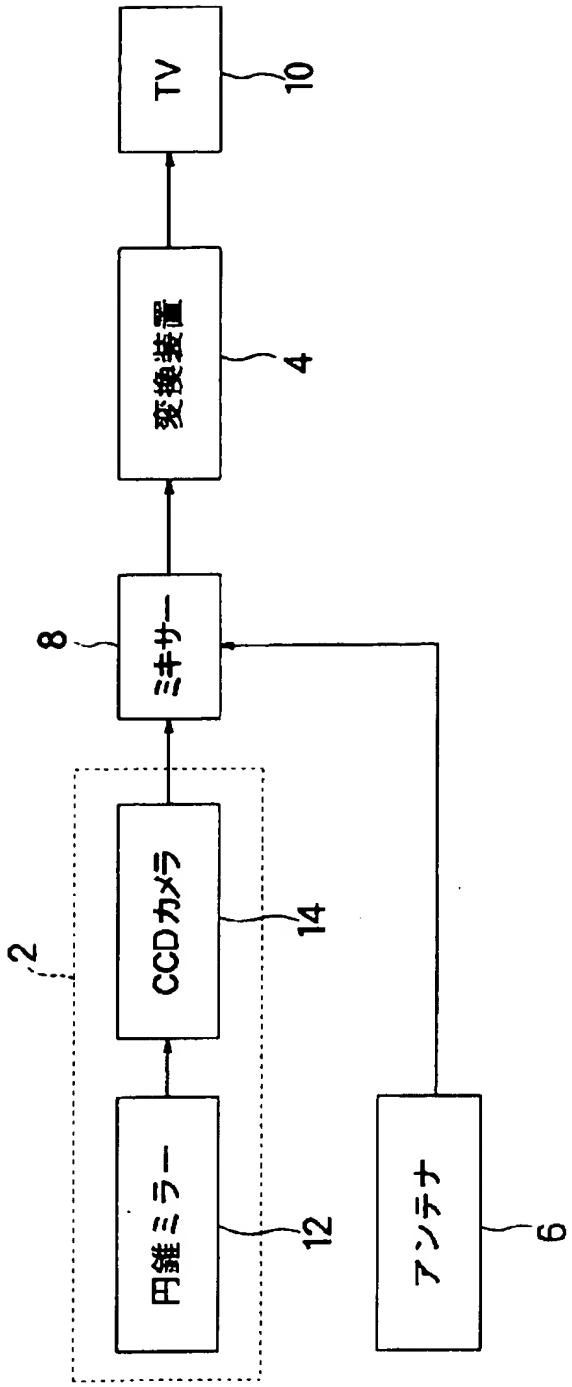

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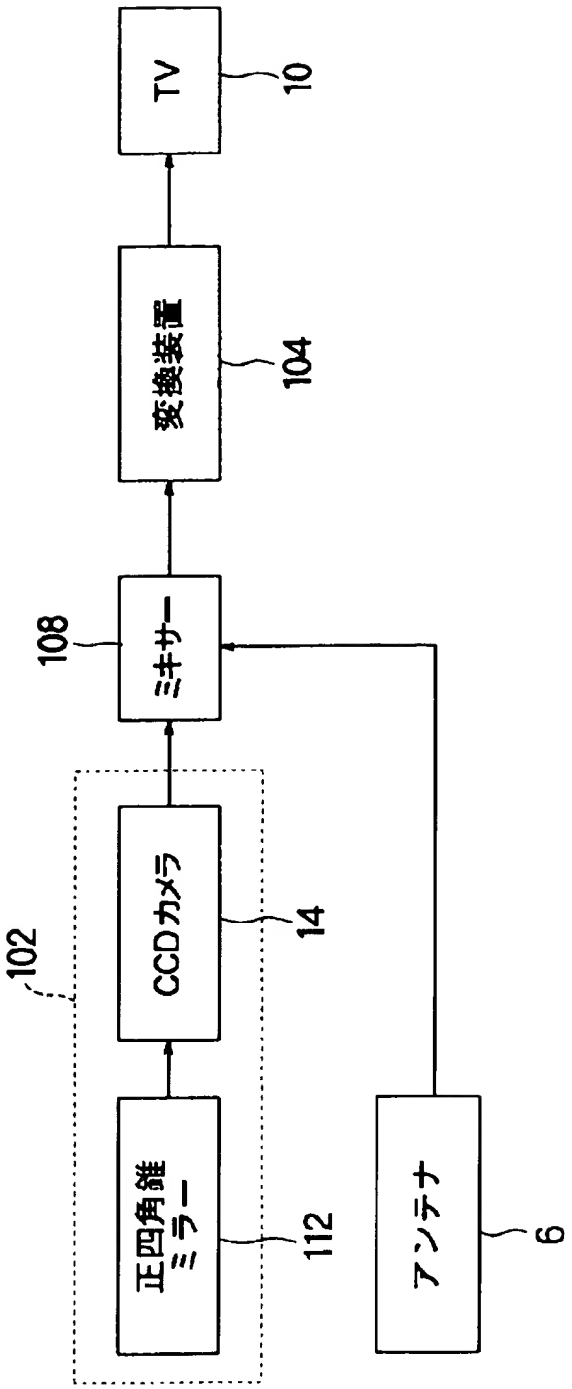

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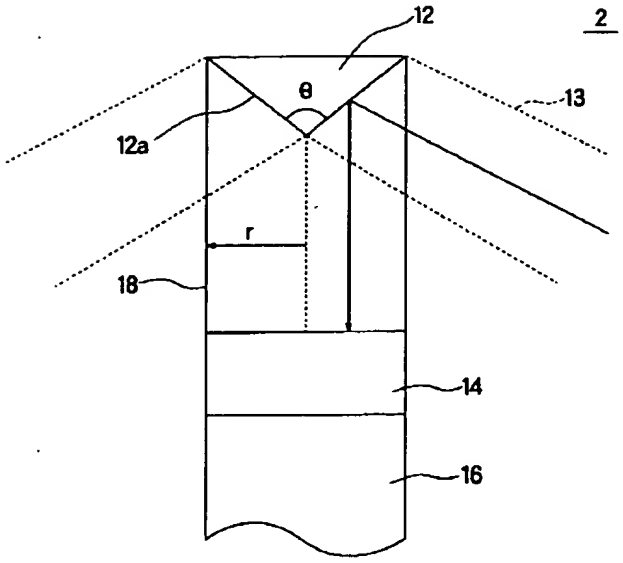

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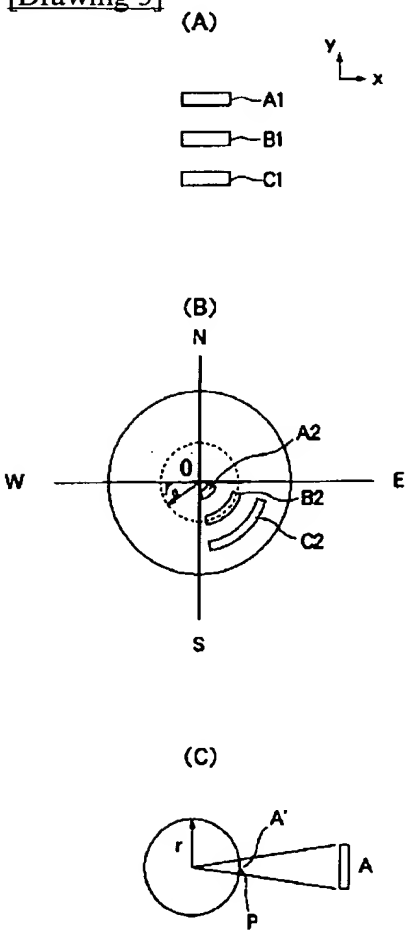

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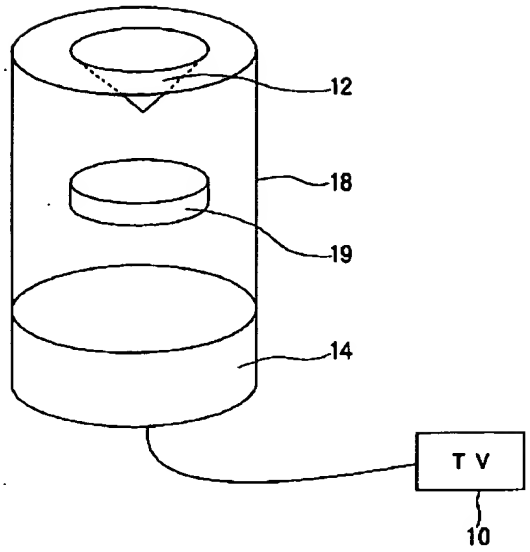
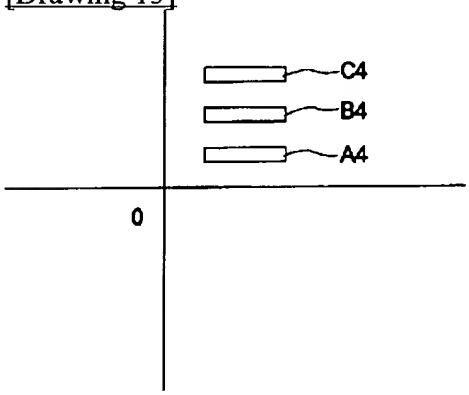


[Drawing 13]



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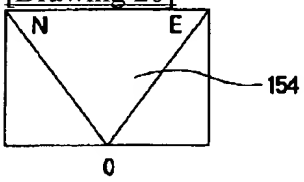
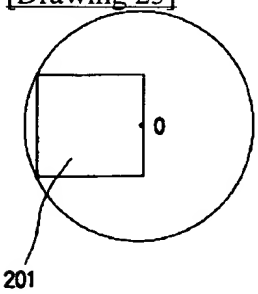


[Drawing 23]



[Drawing 7]

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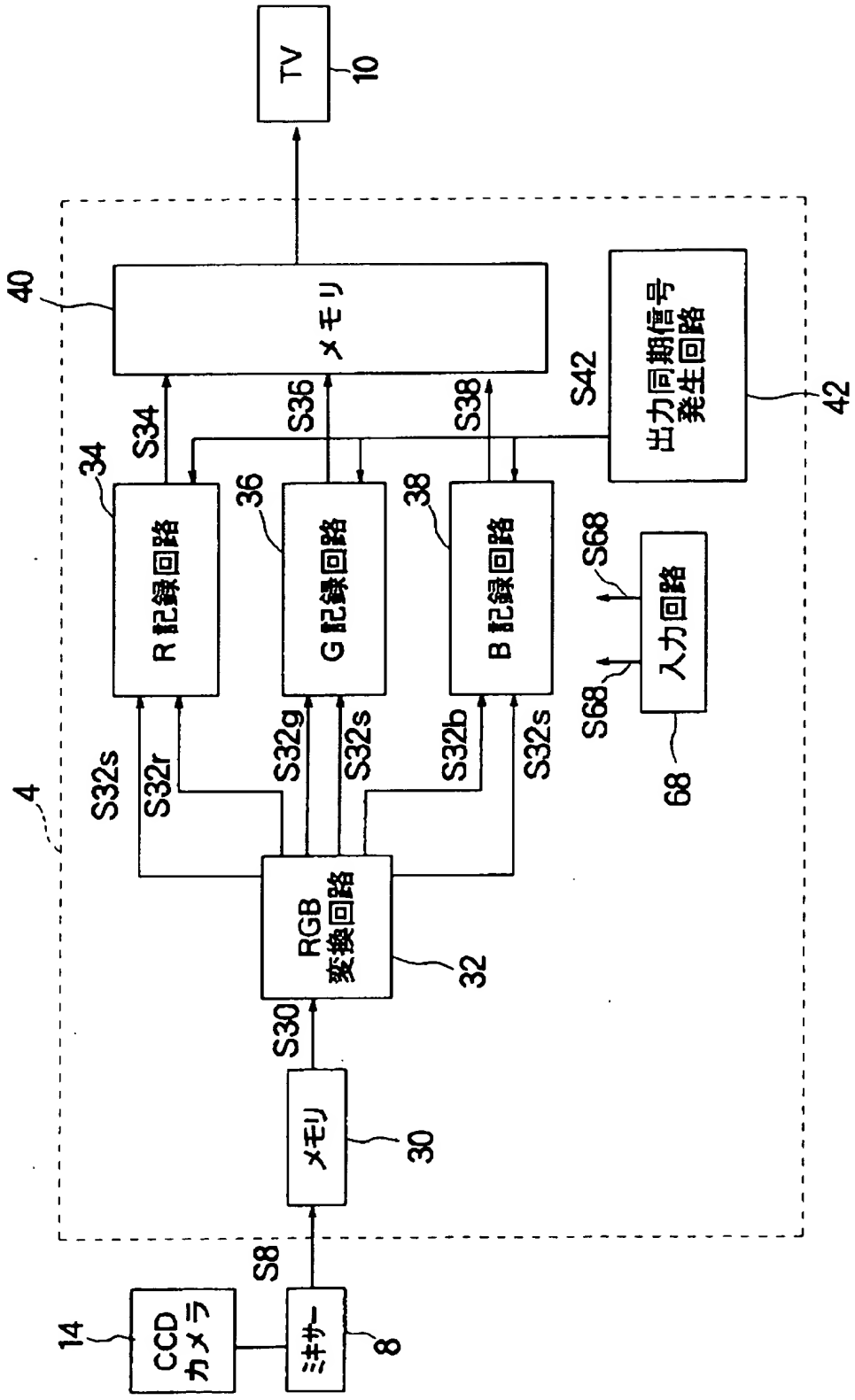

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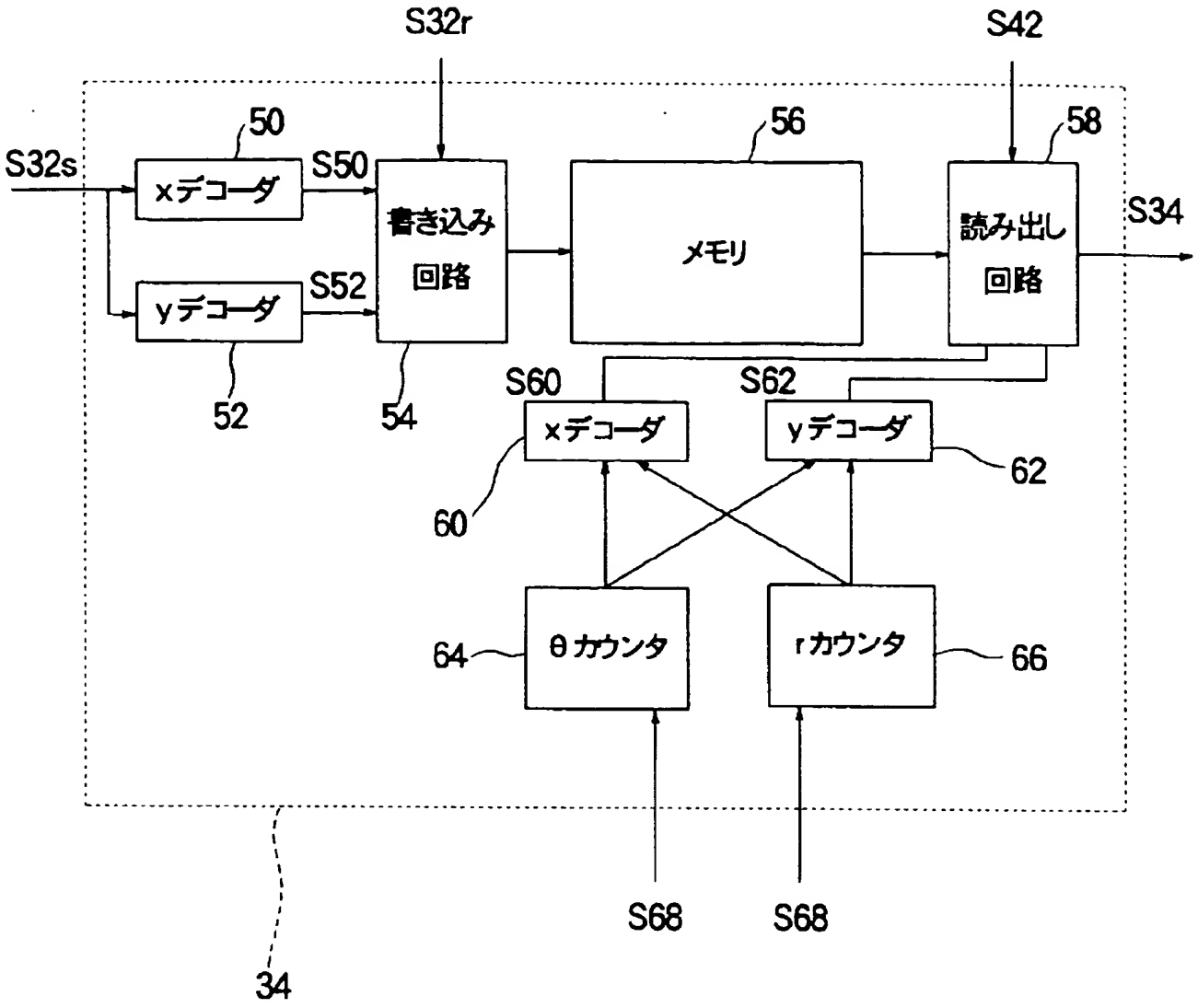
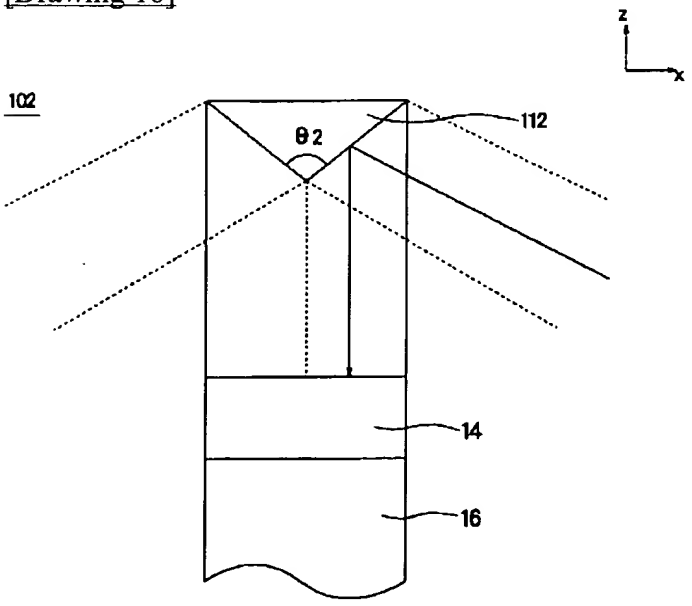
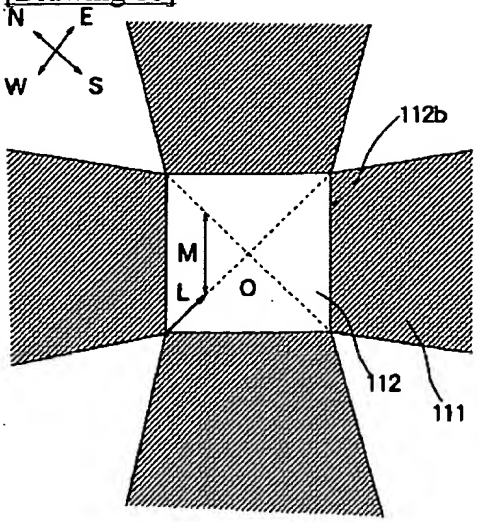


[Drawing 16]



h g cg b eb cg e e

[Drawing 18]



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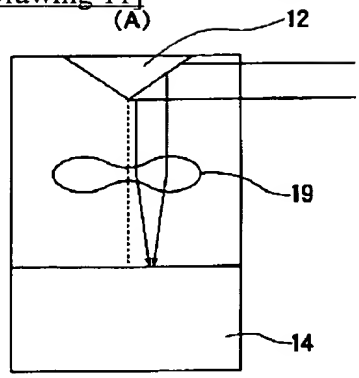

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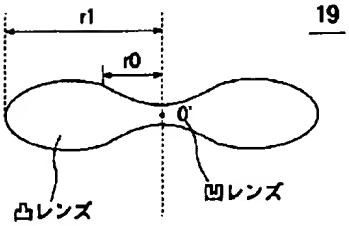
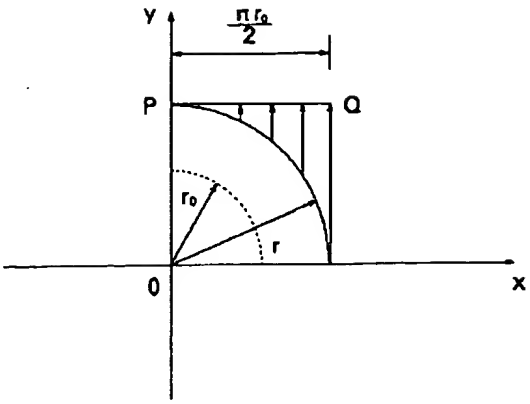


[Drawing 12]

h g cg b eb cg e e

(A)



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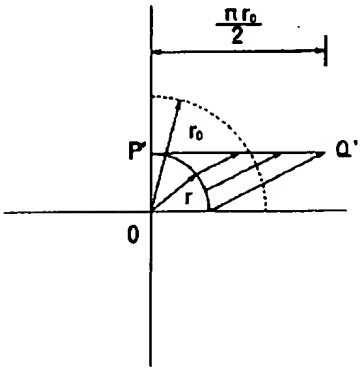

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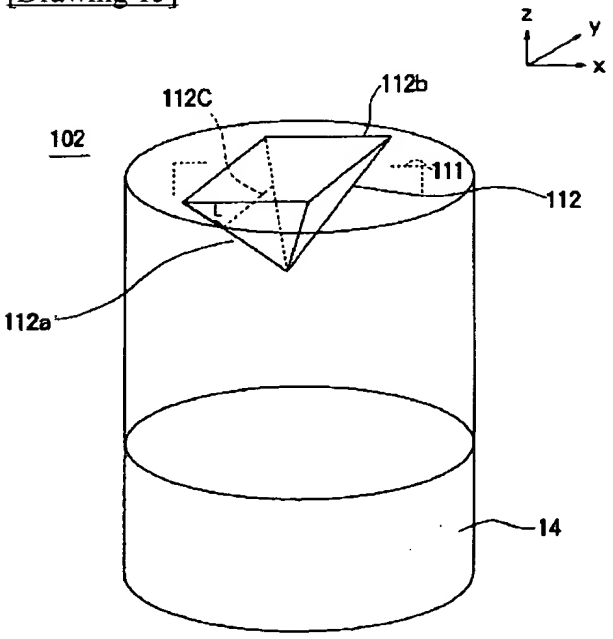

[Drawing 22]

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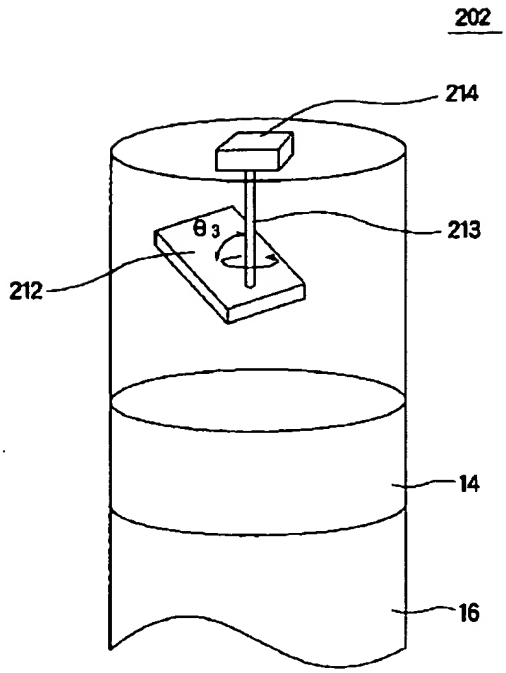
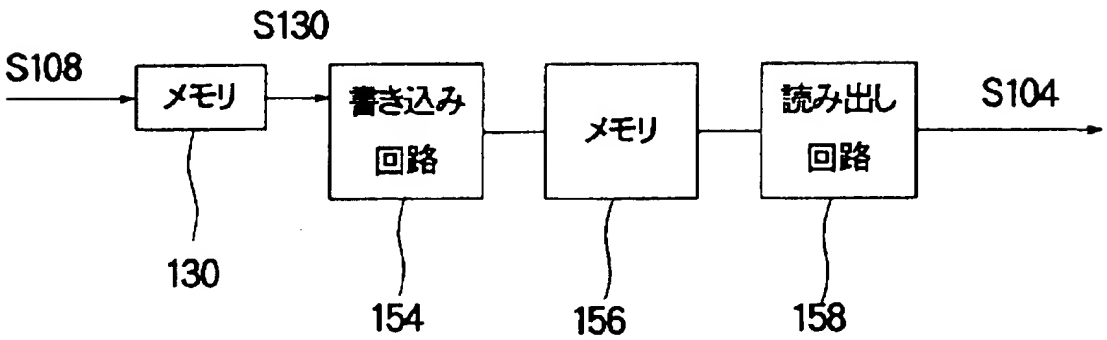


[Drawing 19]



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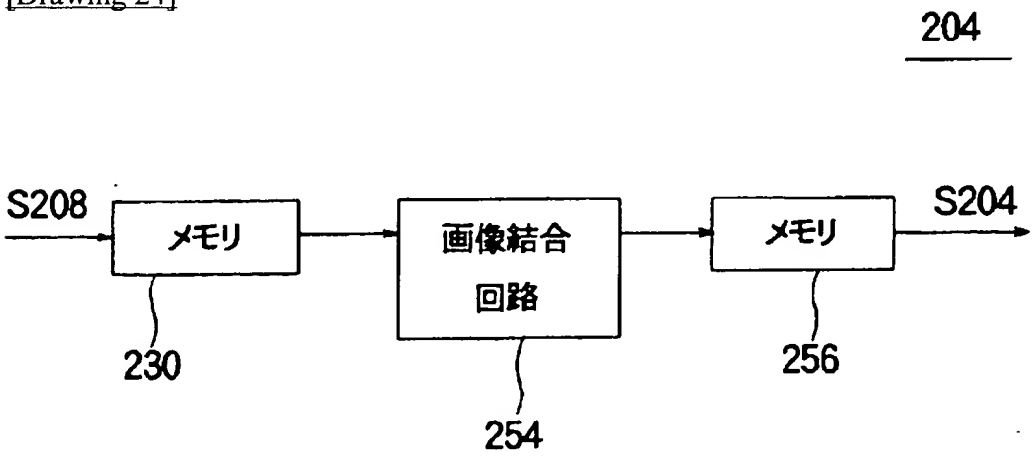

[Drawing 21]

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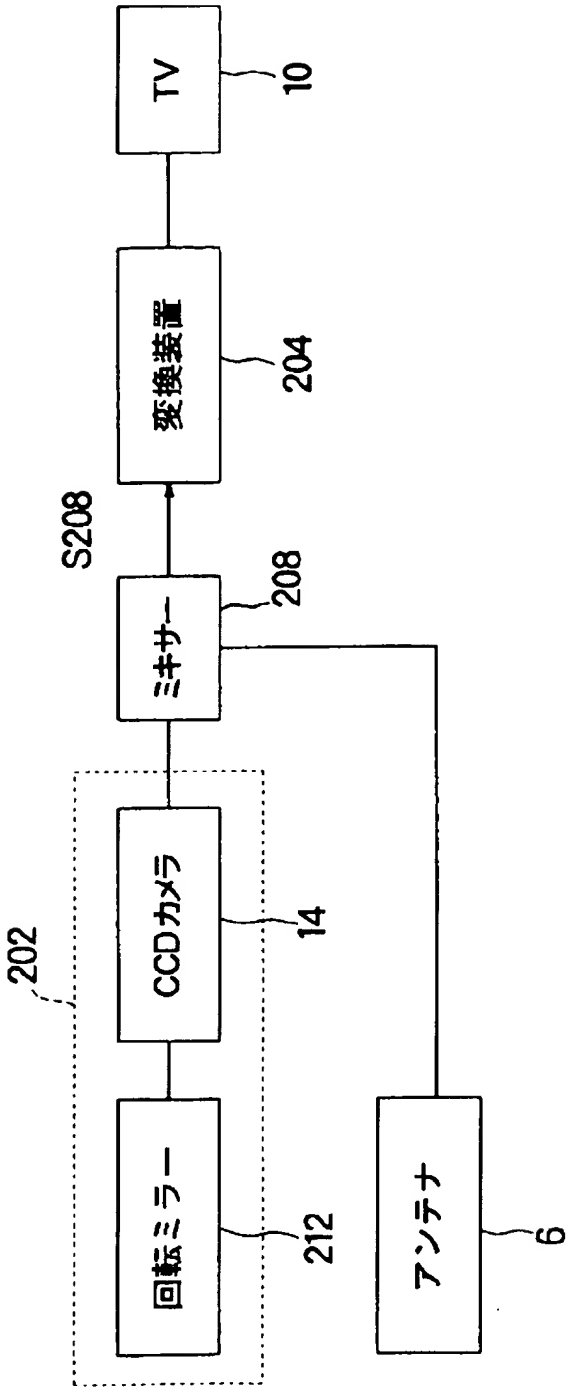

[Translation done.]

h g cg b eb cg e e